WHAT IS CLAIMED IS:

1   1. In a hybrid access and transport network that includes at least one traffic

2   ingress node in communication with at least one traffic egress node, a method for

3   protecting the flow of traffic therein against a failure and for restoring it therefrom,

4   the method comprising:

5   provisioning at least one active Virtual Flow (VF) and at least one protect

6   VF of traffic between the ingress node and the egress node, the active and the pro-

7   tect VFs each taking a different physical path from the other;

8   grouping the active and the protect VFs into respective active and protect

9   Path Protection Groups ("PPGs"), each PPG thereby taking a different physical

10   path from the other;

11   sending protected traffic from the ingress node to the egress node via at

12   least one of the active and the protect PPGs;

13   receiving the protected traffic at the egress node via at least one of the ac-

14   tive and the protect PPGs;

15   detecting a failure in the protected traffic in the active PPG; and,

16   protection switching at least one of the sending and the receiving of the

17   protected traffic from via the active PPG to via the protect PPG in response to the

18   detection of the failure.

1   2. The method of claim 1, in which the protected traffic is sent in parallel

2   via both the active and the protect PPGs.

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1   3. The method of claim 1, in which the protected traffic is sent via the ac-

2   tive PPG, and in which bandwidth is reserved in the protect PPG in an amount

3   equal to that occupied by the protected traffic in the active PPG.

1   4. The method of claim 2, in which the egress node switches the receiving

2   of the protected traffic from via the active PPG to via the protect PPG in response

3   to the detection of the failure.

1   5. The method of claim 3, in which each of the ingress and the egress

2   nodes respectively switches the sending and the receiving of the protected traffic

3   from via the active PPG to via the protect PPG in response to the detection of the

4   failure.

1   6. The method of claim 1, in which:

2   provisioning the VFs further comprises provisioning a dedicated Manage-

3   ment Control Flow ("MCF") in each of the active and the protect PPGs;

4   detecting a failure further comprises generating a protection switching sig-

5   nal ("PSS") in response to the detection of the failure and transmitting the PSS in

6   the MCF of the protect PPG to at least one of the ingress and the egress nodes in

7   response thereto; and,

8   protection switching further comprises at least one of the ingress and the

9   egress nodes receiving the PSS and respectively switching at least one of the

10   sending and the receiving of the protected traffic from via the active PPG to via the

11   protect PPG in response thereto.

1   7. The method of claim 6, in which:

2   the network further comprises an intermediate node between the ingress

3 node and the egress node;

4   the active and the protect PPGs pass through the intermediate node; and,

5   detecting a failure further comprises at least one of the ingress, the interme-

6 diate, and the egress nodes detecting the failure, generating the PSS in response

7 thereto, and transmitting the PSS in the MCF of the active PPG to at least one of

8 the ingress and the egress nodes.

1   8. The method of claim 7, in which the VFs are manually provisioned in

2 each of the ingress, the intermediate , and the egress nodes.

1   9. The method of claim 7, in which the VFs are automatically provisioned

2 by the network by identifying to the network the ingress and the egress nodes for a

3 particular flow of traffic that is to be protected.

1   10. The method of claim 1, in which the hybrid traffic comprises at least

2 one of Time-Division-Multiplexed ("TDM") traffic, Asynchronous Transport

3 Mode ("ATM") traffic, and Multi-Protocol Label Switched ("MPLS") packet traf-

4 fic.

1   11. The method of claim 10, in which the MPLS traffic comprises Internet

2 Protocol ("IP") traffic or Packet Over SONET ("POS") traffic.

1   12. The method of claim 1, in which each of the nodes comprises one of an

2   Add-Drop Multiplexer ("ADM"), an ATM switch, and a Label Switching Router

3   ("LSR").

1   13. The method of claim 1, in which detecting a failure in the protected

2   traffic in the active PPG comprises detecting one of a loss of signal ("LOS"), a loss

3   of framing ("LOF"), and a bit error rate ("BER") in excess of a given threshold

4   value.

1   14. The method of claim 1, in which the network is deployed in one of a

2   linear point-to-point, a star, a mesh, a unidirectional path switched ring, a two-fiber

3   bi-directional ring, and a four-fiber bi-directional ring configuration.

1   15. The method of claim 1, in which the network includes a transport layer

2   comprising at least one of a synchronous digital hierarchy ("SDH") layer, a syn-

3   chronous optical network ("SONET") layer, a direct wavelength division multi-

4   plexing ("WDM") layer, and a Gigabit Ethernet layer .

1   16. The method of claim 1, in which the network includes a physical me-

2   dium comprising at least one of a metal cable, a fiber optic cable, air, vacuum, and

3   water.

1   17. In a hybrid access and transport network that includes at least one traf-

2   fic ingress node in communication with at least one traffic egress node, and in

3   which the hybrid traffic comprises Time-Division-Multiplexed ("TDM") traffic,

4   Asynchronous Transport Mode ("ATM") traffic, and Multi-Protocol Label

5   Switched ("MPLS") packet traffic, a method for protecting the flow of traffic in

6   the network against a failure and for restoring it from such a failure, the method

7   comprising:

8   provisioning at least one active Virtual Flow (VF) and at least one protect

9   VF of traffic between the ingress node and the egress node, the active and the pro-

10   tect VFs each taking a different physical path from the other;

11   grouping the active and the protect VFs into respective active and protect

12   Path Protect Groups ("PPGs"), whereby each PPG takes a different physical path

13   from the other;

14   provisioning a dedicated Management Control Flow ("MCF") in each of

15   the active and the protect PPGs;

16   sending protected traffic from the ingress node to the egress node via at

17   least one of the active and the protect PPGs;

18   receiving the protected traffic at the egress node via at least one of the ac-

19   tive and the protect PPGs;

20   detecting a failure in the protected traffic in the active PPG;

21   generating a protection switching signal ("PSS") in response to the detec-

22   tion of a failure;

23   transmitting the PSS to at least one of the ingress and the egress nodes in at

24   least one of the MCFs of the active and the protect PPGs; and,

25   at least one of the ingress and the egress nodes receiving the PSS and re-

26   spectively switching at least one of the sending and the receiving of the protected

27   traffic from via the active PPG to via the protect PPG in response thereto.

1   18. The method of claim 17, in which the network is operated in one of a

2   bridged mode and an un-bridged mode.

1   19. The method of claim 17, in which the network is deployed in one of a

2   linear point-to-point, a star, a mesh, a unidirectional path switched ring , a two-

3   fiber bi-directional ring, and a four-fiber bi-directional ring configuration.

1   20. The method of claim 17, in which the network includes a transport layer

2   comprising at least one of a synchronous digital hierarchy ("SDH") layer, a syn-

3   chronous optical network ("SONET") layer, a direct wavelength division multi-

4   plexing ("WDM") layer, and a Gigabit Ethernet layer .